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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,361	07/29/2003	Sen-Chia Chang	CHAN3210/EM	4483
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BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314			EXAMINER VO, HUYEN X	
			ART UNIT 2626	PAPER NUMBER
			MAIL DATE 02/12/2008	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/628,361

Applicant(s)

CHANG ET AL.

Examiner

Huyen X. Vo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

1. Upon further consideration of the prior art of record, the combination of Sukkar (US 6292778) and Laurila et al. (US 6772117) fully read on the claimed limitations.

Therefore, examiner's suggestion to claim amendment is withdrawn. Laurila et al. teach the limitation claimed in claim 2 in that a means value and standard deviation value are calculated for the incoming feature vectors. These values are then used to normalize the incoming feature vectors (*col. 6, lines 6-59, the means and standard deviation values are calculated in advance*). Applicant is suggested to amend claim 2 describing that the means and standard deviation values were obtained from training data before runtime.

2. Previous non-final office action has been withdrawn in favor of a new non-final office action.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-2, 8-12, and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sukkar (US 6292778) in view of Laurila et al. (US 6772117).

5. Regarding claim 1 and 11, Sukkar discloses a method and system for utterance verification comprising the steps of:

(A) extracting a sequence of feature vectors from an input speech (*col. 8, line 60 to col. 9, line 19 or referring to element 310 in figure 3*);

(B) inputting the sequence of feature vectors to a speech recognizer for obtaining at least one candidate string (*speech recognizer 312 in figure 3 produces a number of recognition candidates and subword segmentation; also referring to col. 9, line 59 to col. 10, line 19*);

(C) segmenting the input speech into at least one speech segment according to the content of candidate string, which comprises individual recognition units, wherein each speech segment corresponds to a recognition unit and each recognition unit corresponds to a verification unit (*speech recognizer 312 in figure 3 produces a number of recognition candidates and subword segmentation 312; or also referring to col. 9, line 59 to col. 10, line 19*);

(E) utilizing a verification-unit corresponded classifier for each speech segment to calculate the verification score, where the sequence of verification feature vectors of the speech segment is used as the input of the classifier (*col. 10, line 58 to col. 11, line 32 or referring to the operation of figure 4*);

(F) combining the verification scores of all speech segments for obtaining an utterance verification score of the candidate string (*col. 10, line 58 to col. 11, line 32 or referring to the operation of figure 4*); and

(G) comparing the utterance verification score of the candidate string with a predetermined threshold so as to accept the candidate string if the utterance verification score is larger than the predetermined threshold (*col. 11, lines 1-32 or referring to the operation of figure 4*).

While the system of Sukkar inherently includes the step of normalizing extracted speech features for speech recognizer, Sukkar fails to explicitly disclose (D) generating a sequence of verification feature vectors for each speech segment according to the sequence of feature vectors of the speech segment, wherein the verification feature vectors are generated by normalizing the feature vectors using the normalization parameters of the verification unit corresponding to the speech segment. However, Laurila et al. teach (D) generating a sequence of verification feature vectors for each speech segment according to the sequence of feature vectors of the speech segment, wherein the verification feature vectors are generated by normalizing the feature vectors using the normalization parameters of the verification unit corresponding to the speech segment (*col. 4, lines 6-43 or elements 30-31 in figure 3a, the step of normal feature vectors is well known in speech recognition system. In fact, speech features are always adjusted or modified or normalized before fed into the speech recognizer*).

Since Kukkar and Laurila et al. are analogous art because they are from the same field of endeavor, it would have been obvious to one of ordinary skill in the art at

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the time of invention to modify Sukkar by incorporating the teaching of Laurila et al. in order to improve speech recognition and verification accuracy.

6. Regarding claims 2 and 12, Sukkar fails to specifically disclose the method and system as claimed in claims 1 and 11, respectively, wherein in step (D), the normalization parameters of the verification unit are the means and the standard deviations of the feature vectors corresponding to the verification unit in training data, and these parameters are calculated in advance. However, Laurila et al. teach the normalization parameters of the verification unit are the means and the standard deviations of the feature vectors corresponding to the verification unit in training data, and these parameters are calculated in advance (*col. 6, lines 6-59*).

Since Kukkar and Laurila et al. are analogous art because they are from the same field of endeavor, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Sukkar by incorporating the teaching of Laurila et al. in order to improve speech recognition and verification accuracy

7. Regarding claims 8 and 18, Sukkar further discloses the method and system as claimed in claims 1 and 11, respectively, wherein in step (F), the utterance verification score of the candidate string is the mean of the verification scores of the speech segments in the input speech (*col. 11, lines 5-15, averaging subword scores*).

8. Regarding claims 9 and 19, Sukkar further discloses the method and system as claimed in claims 1 and 11, respectively, wherein the input speech is corrupted by noise (*figure 1, speech is received via a telephone network, thus, a certain amount of noise must be added to the speech signal when received*).

9. Regarding claims 10 and 20, Sukkar further disclose the method and system as claimed in claims 6 and 16, wherein the speech segments used for training are corrupted by noise (*speech recognizer 312 in figure 3 contains HMM models that are trained in advance; the speech used to train the speech recognizer 312 in advance inherently includes noise generated by either microphone or communication channel*).

10. Claims 3-7 and 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sukkar (US 6292778) in view of Laurila et al. (US 6772117) and further in view of Carey et al. (US 5526465).

11. Regarding claims 3 and 13, Sukkar fails to specifically disclose the method and system as claimed in claims 1 and 11, respectively, wherein in step (E), the classifier is a neural network, and the neural network is an multi-layer perceptron (MLP). However, Carey et al. teach that the classifier is a neural network, and the neural network is a MLP (*col. 11, lines 1-20*).

Since Sukkar and Carey et al. are analogous art because they are from the same field of endeavor, it would have been obvious to one of ordinary skill in the art at the

time of invention to modify Sukkar by incorporating the teaching of Carey et al. in order to increase discrimination between world models and personal models to improve the verification process.

12. Regarding claims 4 and 14, Sukkar further discloses that the verification score of a speech segment is the mean of the verification scores of the sequence of verification feature vectors corresponding to the speech segment (*col. 11, lines 5-15, averaging subword scores*). Sukkar, however, fails to specifically disclose wherein the MLP is used to calculate the verification score by inputting the verification feature vector and performing the feed-forward processing. However, Carey et al. teach wherein the MLP is used to calculate the verification score by inputting the verification feature vector and performing the feed-forward processing (*col. 9, lines 43-50, forward and backward pass calculations*).

Since Sukkar and Carey et al. are analogous art because they are from the same field of endeavor, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Sukkar by incorporating the teaching of Carey et al. in order to improve speech recognition accuracy.

13. Regarding claims 5 and 15, Sukkar fails to specifically disclose the method and system as claimed in claims 3 and 13, respectively, wherein the MLP is trained by using an error back-propagation algorithm to reduce the mean square error between the verification score output of the MLP and the target value. However, CAREY ET AL.



teach wherein the MLP is trained by using an error back-propagation algorithm to reduce the mean square error between the verification score output of the MLP and the target value (*col. 11, lines 1-20 and col. 12, lines 1-20*).

Since Sukkar and Carey et al. are analogous art because they are from the same field of endeavor, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Sukkar by incorporating the teaching of Carey et al. in order to increase discrimination between world models and personal models to improve the verification process.

14. Regarding claims 6 and 16, Sukkar fails to specifically disclose the method and system as claimed in claims 5 and 15, respectively, wherein the MLP corresponding to the verification unit is trained by inputting the sequences of verification feature vectors of the speech segments corresponding to the verification unit and the sequences of verification feature vectors of the speech segments not corresponding to the verification unit. However, Carey et al. teach wherein the MLP corresponding to the verification unit is trained by inputting the sequences of verification feature vectors of the speech segments corresponding to the verification unit and the sequences of verification feature vectors of the speech segments not corresponding to the verification unit (*col. 10, line 43 to col. 11, line 34*).

Since Sukkar and Carey et al. are analogous art because they are from the same field of endeavor, it would have been obvious to one of ordinary skill in the art at the

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time of invention to modify Sukkar by incorporating the teaching of Carey et al. in order to train the speech recognizer to recognize the speaker with high accuracy.

15. Regarding claims 7 and 17, Sukkar fails to specifically disclose the method and system as claimed in claims 6 and 16, wherein the target value is 1 if the speech segment corresponds to the verification unit and which is 0 if the speech segment does not correspond to the verification unit. However, Carey et al. teach wherein the target value is 1 if the speech segment corresponds to the verification unit and which is 0 if the speech segment does not correspond to the verification unit (*col. 11, line 60 to col. 12, line 7,  $P_p=0$  and  $P_w=1$ , that means the speaker is not verified; and  $P_p=1$  and  $P_w=0$  means the speaker is verified*).

Since Sukkar and Carey et al. are analogous art because they are from the same field of endeavor, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Sukkar by incorporating the teaching of Carey et al. in order to verify speaker with high accuracy.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Huyen X. Vo whose telephone number is 571-272-7631. The examiner can normally be reached on M-F, 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on 571-272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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